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NPIC/R-26/63  
March 1963

[REDACTED] PHOTOGRAPHIC INTERPRETATION REPORT

## ELECTRIC POWER GRID IN THE NORTH URAL AREA OF THE USSR



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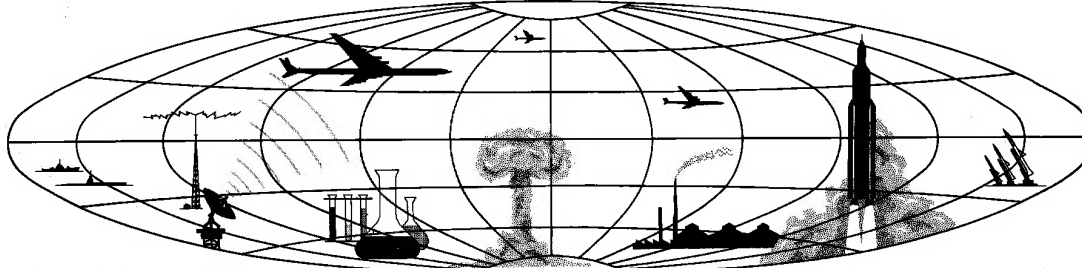
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## INTRODUCTION

This report is in answer to a specific requirement for information on the availability of electric power in the North Ural area. It is the first of a planned series of photographic interpretation reports on the electric power distribution in the Soviet Union. These reports are intended to provide basic information on the status of generative capacity and the flow of electric power in the areas studied. This information is based on the photography and the collateral documents and maps listed in the references. Some of the Soviet open-source material, particularly newspaper and magazine files, are not listed. Soviet-published discussions of the current Seven-Year Plan (1958-1965) provided the schematic circuit diagrams of power lines of 220 kilovolts (kv) or higher voltages.

This study examined all available good-quality photography of the North Ural area (Figure 1) beginning with TALENT photography [redacted] and including subsequent KEYHOLE photography [redacted]. The overall reliability of the information on power circuits presented in this report is rated as possible. However, limiting conditions, noted on some of the data, are shown on the schematic diagrams.

## NEW OBSERVATIONS

Photography from recent missions shows an expansion of electric power circuits in the North Ural area (Figures 2 and 3), particularly between Nizhnyaya Tura

and Perm', and between Perm' and Krasnoturinsk. Additional circuits have been added to the local network north and west of Nizhnyaya Tura. 1/ The additional 110-kv circuits previously identified in the vicinity of Verkh-Neyvinsk [redacted] are probably completed and in service. 2/ [redacted]

Two east/west 500-kv power lines of the Unified National Power Grid terminate in the North Ural grid at Yuzhnaya Substation in Sverdlovsk. The section of the line from Sverdlovsk west to Votkinsk in the Bashkir grid is under construction; the section from Sverdlovsk south to Chelyabinsk in the Central Ural area is completed.

## DESCRIPTION OF GRID

The power services of the North Ural area with its atomic energy installations and key industries is part of a network (URALENERGO) serving the entire Ural area which in turn is tied to the USSR's expanding Unified National Power System. The North Ural area studied in this report is roughly pentagonal in shape and extends approximately 180 nautical miles northward and northwestward from Sverdlovsk at its southeastern apex. Most of the power available in the area is generated at points within the area. These power plants, which are described, referenced, and keyed to item numbers in Table 1, are tied into the grid by circuits of 110 kv or higher. Six power plants having generative capacities of over 300 megawatts (MW) are located within the area; five are thermal electric and one is hydroelectric.

The North Ural grid serves several major power-using centers. The principal centers (reading northward on the eastern side of the grid, then the two areas on the western side) are as follows:

The industrial center of Sverdlovsk (Figure 6). The 500-kv power line from Chelyabinsk services the Yuzhnaya substation on the southern outskirts of Sverdlovsk. This substation has 220-kv circuit connections with the city of Perm' [redacted] and circuit connections of lesser voltage with nearby points in the Central Ural area -- Beloyarskaya Atomic Power Station (AES) and the towns of Kamensk-Ural'skiy, Asbest, and Pervoural'sk. No major power plant of the North Ural grid is located in the immediate vicinity of Sverdlovsk. A thermal electric power plant at Sredne-Ural'sk (SUGRES) (Item 22), which has an estimated capacity of 234 MW, is located north of Sverdlovsk and south of Verkh-Neyvinsk.

Nizhnyaya Tura Atomic Energy Complex (Figure 3) and surrounding area in the center of the grid. The Nizhne-Turinskaya GRES (Item 16), located at the complex, has an estimated capacity of 550 MW. This area is linked by circuits to the city of Perm' to the west and to the town of Serov in the north.

Serov/Krasnoturinsk/Karpinsk industrial complex. This complex is located at the northeastern apex of the North Ural grid. Two major power plants are located in this vicinity -- Serovskaya GRES (Item 21) of 400-MW capacity and Krasnoturinskaya TETS Bogoslav (Item 11) of 325-MW capacity. This complex is linked by power lines with the Chusovoy area to the southwest.

Berezniki/Solikamsk area. This area is located at the northwestern apex of the North Ural grid. In this area, the Yayvinskaya GRES (Item 29), which is under construction near Yayva, will provide 300-600 MW of power. The area is linked by circuits to the industrial center of Perm' to the south.

Kizel/Gubakha area. Although three power plants are located in this area, including the Shirokhovskaya hydroelectric station (Item 9) on the Kos'va River, none of the plants have large capacities. Detailed analysis of power distribution in this area is precluded by poor photography.

Industrial center of Perm' (Figure 5). Perm' is located at the southwestern apex of the grid. KamGES (Item 18), a hydroelectric power plant of 504 MW capacity, is located on the Kama River at Perm'. The city, as reported earlier, is connected by circuits to the north, the northeast, and by the long 220-kv line without an intermediate substation to Sverdlovsk in the southeast.

Nizhniy Tagil/Verkhnyaya Salda Area. Although three power plants are located at Nizhniy Tagil, no major plant is located in this vicinity.

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TABLE 1. POWER PLANTS SERVING NORTH URAL GRID

Item No	Location (nearest town)	Soviet Designation of Power Plants*	Coordinates of Power Plant	BE No	Capacity** (MW)	Voltages of Grid Served by Power Plant 3/	Reliability***	Sources of Photography (date of latest available)	References
1	Berezniki	Bereznikovskaya TETS	59-24N 56-44E		105	110 kv.	Confirmed		4/
2	Berezniki	Bereznikovskaya TETS BMZ (Berezniki Machine Plant)	59-25N 56-45E		100	Undetermined. Possibly tied into grid through local low-voltage circuits. Serves magnesium plant.	Probable		4/
3	Borovsk	Solikamskaya TETS	59-41N 56-40E		24	110 kv.	Probable		4/
4	Gubakha	Kizelovskaya GRES	58-52N 57-33E		98	Undetermined.	Possible		4/
5	Karelin	Not Available (NA)	56-43N 60-23E		11 (est)	110 kv. Serves electrified railway, possibly on standby.	Probable		-
6	Karpinsk	NA	59-45N 59-59E		25 (est)	Undetermined. Possibly tied to grid through local low-voltage circuits.	Probable		-
7	Kirovgrad	NA	57-25N 60-04E		25	Probably 110 kv.	Confirmed		2/, 4/
8	Kizel	Kizelovskaya GRES Zapadnaya (west)	59-03N 57-36E		60	Possibly 110 kv.	Probable		4/
9	Kos'va River (near Gubakha)	Shirokhovskaya GES	58-50N 57-47E		24	Undetermined.	Confirmed		-
10	Krasnokamsk	Krasnokamskaya TETS-5 Zakam	58-05N 55-40E		150	Possibly 110 kv.	Possible		4/
11	Krasnoturinsk	Krasnoturinskaya TETS Bogoslav	59-46N 60-11E		325	220 kv.	Probable		4/
12	Kushva	Kushvinskaya TETS	58-17N 59-44E		Small	Undetermined. Possibly tied by low-voltage circuits to grid.	Probable		-
13	Nizhniy Tagil	Nizhne-Tagil'skaya TETS Kuybyshev	57-54N 59-56E		Small	For local power supply at low-voltage	Probable		-
14	Nizhniy Tagil	Nizhne-Tagil'skaya TETS Kaganovich 183	57-56N 60-06E		100	110 kv.	Confirmed		4/
15	Nizhniy Tagil	Nizhne-Tagil'skaya TETS Novo Tagil	57-56N 60-01E		87	110 kv.	Confirmed		4/
16	Nizhnaya Tura	Nizhne-Turinskaya GRES	58-36N 59-46E		550 (est)	220, 110 & 35 kv. Serves atomic energy complex, 110-kv circuits. Photography shows 7 outgoing	Confirmed		1/
17	Novaya Lyalya	Novaya Lyalinskaya TETS	59-03N 60-39E		12-13 (est)	Possibly 110 & 35 kv.	Confirmed		4/
18	Perm' (formerly Molotov)	KamGES	58-07N 56-21E		504	220 & 110 kv.	Confirmed		3/
19	Perm'	Perm'skaya TETS (Aircraft Components Plant)	57-59N 56-14E		NA	Undetermined. No evidence of being in operation.	Possible		-
20	Perm'	Perm'skaya GRES-2	58-01N 56-10E		6.5	Undetermined.	Possible		-
21	Serov	Serovskaya GRES	59-38N 60-42E		400	220 & 110 kv.	Confirmed		4/
22	Sredne-Ural'sk	SUGRES	57-00N 60-29E		284 (est)	110 & 35 kv. Reference 4/ shows 7 outgoing 110-kv circuits. Photography shows 8.	Confirmed		2/, 5/, 7/
23	Sverdlovsk	Sverdlovskaya TETS Ural'mash	56-52N 60-53E		28	Undetermined. Possibly tied to grid by 110-kv or lower voltage circuits.	Confirmed		4/, 8/
24	Sverdlovsk	Sverdlovskaya TETS Kuybyshev	56-50N 60-30E		Small	110 kv.	Confirmed		-
25	Sverdlovsk	Sverdlovskaya GES Ukhtas	56-47N 60-37E		Small	Undetermined.	Confirmed		-
26	Verkhotur'yev	Verkhoturinskaya GES	58-51N 60-45E		Small	Undetermined. Possibly tied to grid by local low-voltage circuits.	Probable		-
29	Yayva	Yayvinskaya GRES	59-20N 57-14E		300-600 U/C	Probably will be tied to 110-kv grid, possibly to 220-kv grid.	Confirmed		-

\*Power plants shown in boldface have an installed capacity of 300 MW or more. Soviet designations are as follows: TETS -- thermal electric power plant; GES -- hydroelectric power plant; GRES -- national regional power plant.  
\*\*Capacity estimated as "small" is probably less than 24 MW.

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REQUIREMENT

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